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# CERATOPOGONIDAE (DIPTERA) FROM BRITISH GUIANA AND TRINIDAD. PART 2

By J. W. S. Macfie, M.A., D.Sc., M.B., Ch.B., F.R.E.S.

*Monohelea multilineata* (Lutz, 1914).

British Guiana: Mazaruni, 2nd growth (Low Forest), 21.viii.1937, 1 ♂.

This insect, I think, must be assigned to the species described by Lutz (1914) under the name *Palpomyia multilineata* because although it is apparently smaller (length of wing about 1·1 mm.) and much darker in colour, its wings are exactly like the one figured in Lutz' paper. To account for the pale colour of Lutz' specimens, which he says were microscopical preparations, I can only suggest that they may have been discoloured either by prolonged preservation in spirit, or during the process of preparation for mounting on slides.

The specimen before me is a very dark brown or blackish insect.

♂. Head blackish, with silvery pruinescence. Antennae short, with pale, yellowish, plume: segment 3 with long stalk; 4–11 pale, sub-equal, length about 8–9 units; 12 similar, only a little longer, about 11 units; 13–15 darkish brown, elongate, sub-equal, about 25 units, the last tapering distally and ending in a minute point or stylet. Thorax very dark brown with a fine silvery pruinescence which, however, fails at bases of hairs, thus producing a spotted appearance. Scutellum very dark brown at sides and in middle, pale brown in between. Legs dark or very dark brown, especially femora and tibiae which are blackish; knees and ends of adjoining segments pale. Hind legs with femora rather broad; 1st tarsal segment with a basal spine. All tarsi with 4th segment cylindrical; 5th unarmed. Abdomen very dark brown but with tergites 2–7 largely pale, silvery. Hypopygium very dark, blackish; its component parts not examined.

The resemblance of this species to *M. nigeriae* Ingram & Macfie and other similar species found in different parts of the world is remarkable, but at the present time to make a comparison, or to suggest synonymy, would be premature owing to lack of sufficient material.

## **Echinohelea** gen. n.

The three species whose descriptions follow are all very similar. They resemble in general appearance some species of *Serromyia*, and to this genus I would refer them were it not that they lack both the main characteristics of that genus, namely, the greatly swollen femora of the hind legs, and the relatively short second radial cell. It is necessary, I think, to erect for them a new genus for which I propose the name *Echinohelea*. The chief characters are as follows:—

*General characters.* Eyes bare. Antennae of female with last five segments elongate, but last rather shorter than others. Thorax without anterior tubercle, bearing a few stout bristles. Wings without macrotrichia. Costa not extremely long, and not prolonged beyond junction with R4 + 5. Two radial cells, second much longer than first. Median vein sessile, that is forking at or very near level of cross-vein. Legs with femora of fore and hind legs not greatly swollen, femora and tibiae all armed with spines, some rather long, scattered rather irregularly. Tarsi with 4th segment short, but not clearly cordiform or bilobed: 5th not inflated, unarmed. Claws of female barbed, equal or unequal.

The genotype is *E. ornatipennis* sp. n.

**Echinohelea ornatipennis** sp. n.

A yellowish-brown species with the thorax adorned with four pale or silvery patches, the wings adorned with two dark spots, the hind legs adorned, and all the femora and tibiae armed with long spines.

♂, ♀. Length of wing about 2 mm., greatest breadth 0·5–0·6 mm.

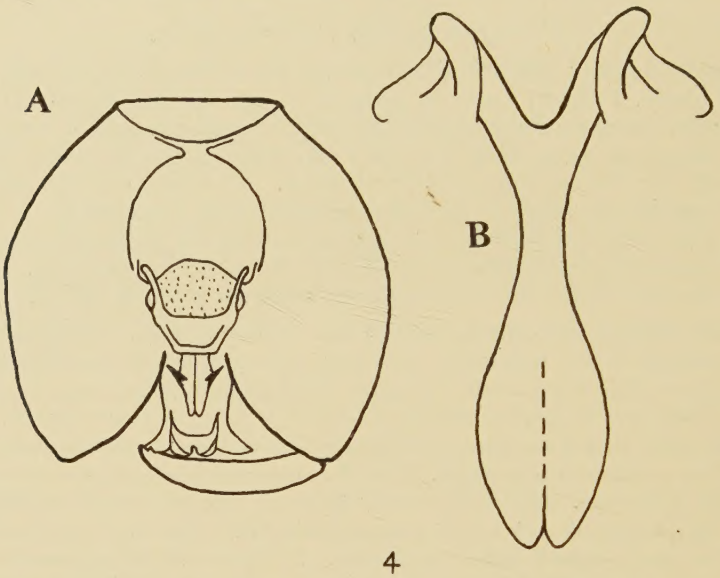


Fig. 4.—*Echinohelea ornatipennis* sp. n., hypopygium, ventral view, A. ninth segment and aedeagus, B. harpes at a higher magnification.

*Head* dark yellowish-brown. Eyes bare, separated above. Palpi pale, yellowish-brown, the third segment only slightly inflated, with a subapical pit : lengths of last three segments about 20, 14, and 22 units respectively. Antennae of female with torus yellowish-brown and flagellum segments (excepting bases of 3 to 8 which are paler) dark brown : segment 3 with numerous small sensory pits near apex; 4–10 sub-cylindrical to an elongate bottle-shape, ranging from about 20 by 8 (maximum) to 31 by 6 units; 11–14 similarly bottle-shaped, sub-equal, about 40 by 6 (maximum) units; 15 shorter, sub-cylindrical, length about 30 units, tapering distally and ending in a minute point. The combined lengths of segments 3–10, 4–10, and 11–15 about 220, 185, and 185 units respectively. Antennae of male at first glance rather like those of female but with longer hairs. There is no distinct plume. Torus yellowish-brown, flagellum segments darkish brown excepting bases of 3–6 which are paler brown. Segments 4–11 all similar, from sub-cylindrical to an elongate bottle-shape, ranging from about 18 by 7 (maximum) to 31 by 6 (maximum) units; 12 similar to 11 but slightly shorter, about 26 units; 13 and 14 also similar, about 35–41 by 6 (maximum) units; 15 without long hairs, length about 30 units, tapering distally and ending in a minute point. *Thorax* yellowish-brown, mottled with rather darker brown markings, with a dark area immediately anterior to scutellum, and with four pale or silvery patches on dorsum, namely, on shoulder areas, and on each side a little anterior to points of insertion of wings; bearing some stout blackish bristles especially on posterior portion, and notably a group of about 9 above each wing. No anterior tubercle. Scutellum dark brown at sides, paler in middle; bearing in female a transverse row of about 10 dark bristles and about a dozen small hairs, in male not quite so many. *Wings* long and narrow, adorned with two small dark brown areas which are situated the one over

the cross-vein, and the other immediately below extremity of R4 + 5. Veins brownish. Tip rounded. Anal angle very obtuse. Fringe normal. No macrotrichia, and no bristles excepting those on costa which are small and rather widely spaced. Microtrichia conspicuous, covering whole surface of wing. Costa extending about four-fifths length of wing, not prolonged beyond R4 + 5, ending at a level slightly distal to that of end of Cu1. Two radial cells; first oval, second widely open, about 3 times as long as first in both sexes. Cross-vein rather long. M sessile, forking at cross-vein or perhaps slightly distal to it. Fork of Cu slightly proximal to level of cross-vein. Halteres with brownish knobs. *Legs* mainly yellowish-brown, with femora and tibiae of four anterior legs rather deeper in colour than corresponding tarsi, and hind legs more distinctly adorned, having the apical third of femur and tip and basal three-quarters of tibia dark brown. All legs, too, with 5th segment of tarsi dark brown. Form of segments normal; femora of hind legs only a little broader than others. Hairs short, normal. All femora and tibiae armed with dark spines some of which are long: hind legs with about a dozen on each. T.R. about 2·5. Tarsi with 1st segment armed on middle legs with an apical and a basal spine and one near its middle, on hind legs with a basal spine only; 4th on all legs short and sub-cylindrical, not definitely cordiform or bilobed; 5th unarmed. Claws rather large: in female equal and barbed on inner side on fore legs, unequal and barbed on inner side on four posterior legs; in male equal on all legs, and apparently simple, not barbed but bifid at extreme tips. *Abdomen* darker brown than thorax, with posterior border and sides of tergites darker than middle portion. Spermathecae and gland rods not examined. In male abdomen very short, 2nd segment large, others much reduced: coloration as in female. Hypopygium (fig. 4) very large, yellowish-brown, but with apex and outer side of side-pieces dark brown, and claspers entirely blackish. Ninth segment much reduced: tergite small, with very few bristles, and posterior margin cleft in middle and with triangular lateral processes; sternite slightly excavated in middle line posteriorly, the membrane joining it to aedeagus spiculate. Side-pieces oval and very large; claspers ending in 2–3 small teeth. Harpes fused about middle, well chitinised rods with slightly expanded ends. Aedeagus highly chitinised at base forming a wide arch, with distal stem composed of two structures shaped like the barbs of a fish-hook.

British Guiana: Mazaruni, 2nd growth (Low Forest), 16.viii.1937, 2 ♂♂ (one headless), and 21.viii.1937, 1 ♀. The males are peculiar and may perhaps be abnormal.

### **Echinohelea richardsi** sp. n.

A dark brown insect similar to the preceding species but smaller and darker, with unadorned wings, and furnished with fewer spines on the femora and tibiae.

♀. Length of wing 1·3–1·4 mm., greatest breadth about 0·4 mm.

*Head* darker brown. Palpi similar but darker. Antennae with torus dark yellowish-brown and flagellum segments almost entirely darkish brown; segments 4–10 from elongate oval to vasiform, ranging in one specimen from 13 by 6 to 21 by 5 (maximum) units; 11–14 more elongate, sub-equal, about 30 by 5 (maximum) units; 15 about 27 units long, tapering, ending in a minute point. The combined lengths of segments 3–10, 4–10, and 11–15 about 146, 120, and 146 units respectively. *Thorax* rather dull yellowish-brown, not so dark immediately anterior to scutellum, and with the four pale patches less distinct and not silvery. No anterior tubercle. Scutellum bearing fewer bristles and hairs, only about 6 of each. *Wings* brownish, especially along anterior border, but without dark spots; otherwise as in the preceding species. Fork of M at cross-vein. *Legs* similar, but femora and tibiae armed with fewer spines. Fore legs without any definite spines on tibiae; hind legs with only about 5 spines each on femora and tibiae. Claws as in preceding species. *Abdomen* darker brown. Eighth segment chitinised all round. No gland rods, and no especial vulval armature. Spermatheca single, highly chitinised, pitted, sub-

spherical, diameter about 70 μ; the chitinised part of duct rather long, about 30 μ, and very narrow distally, about 3 μ.

British Guiana: Mazaruni, 2nd growth (Low Forest), 21.viii.1937, 2 ♀♀.

### **Echinohelea smarti** sp. n.

A brown species very similar to *Echinohelea ornatipennis* but with the claws all equal and barbed.

♀. Length of wing nearly 1·8 mm., greatest breadth about 0·5 mm.

*Head* dark yellowish-brown. Eyes bare, separated above. Palpi yellowish-brown, the third segment with a shallow sub-apical pit: lengths of last three segments about 20, 11, and 18 units respectively. Antennae with torus yellowish-brown, flagellum segments darkish brown but with bases of 3–10 paler, yellowish: segment 3 with numerous small sensory pits near apex; 4–10 sub-cylindrical to an elongate vase shape, ranging in one specimen from about 16 by 7 (maximum) to 25 by 4–5 units; 11–15 more elongate, 33–39 by 4–5 units, the last ending in a minute point. The combined lengths of segments 3–10, 4–10, and 11–15 about 170, 140, and 180 units respectively. *Thorax* yellowish-brown, mottled with somewhat darker brown markings, with a dark patch just anterior to scutellum, and four pale areas similar to those in *Echinohelea ornatipennis* but less silvery; bearing some stout dark bristles, notably a group of about 9 above each wing. No anterior tubercle. Scutellum yellowish-brown but darker at sides than in middle: bearing a transverse row of 7–8 dark bristles, and a few (about 6) small hairs. *Wings* long and narrow, unadorned, but brownish especially near anterior border, and perhaps with traces of more infuscation over cross-vein and at end of R4 + 5. Veins brownish. Tip rounded. Anal angle very obtuse. No macrotrichia. No bristles or only one or two on radial veins, and those on costa small and separated rather widely. Microtrichia conspicuous, covering whole surface of wing. Fringe normal. Costa extending about four-fifths length of wing, not prolonged beyond R4 + 5. Two radial cells: first oblong, second widely open, about three times as long as first. Cross-vein rather long. M sessile, forking at level of cross-vein or very slightly proximal to it. Fork of Cu slightly proximal to level of cross-vein. Halteres with infuscated knobs. *Legs* yellowish-brown, femora and tibiae (especially apex and basal three-quarters of tibiae of hind legs) darker than rest, and all tarsi with 5th segment infuscated. Form of segments normal, none swollen or inflated. Femora of hind legs hardly at all wider than others. Hairs not very abundant and rather short. Femora and tibiae of all legs armed with dark spines some of which are rather long. Fore legs with only a single spine on tibiae; hind legs with about 7 on femora, and about 10 on tibiae. T.R. about 2·5. First tarsal segment of hind legs with a basal spine. Tarsi of all legs with 4th segment short but sub-cylindrical, not cordiform or bilobed; 5th unarmed. Claws on all legs rather long but not as long as 5th tarsal segment, equal, each with a barb on inner side. *Abdomen* darker brown than thorax, with posterior border and sides of tergites darker brown than middle portions. Eighth segment chitinised all round. No gland rods; and no especial vulval armature. Spermatheca single, highly chitinised, profusely pitted, sub-spherical, diameter nearly 100 μ; the chitinised part of duct rather long, about 30 μ, and very narrow distally, about 3 μ.

British Guiana: Mazaruni, 2nd growth (Low Forest), 16.viii.1937, 1 ♀, and Kaieteur, savannah and environs, 4.ix.1937, 1 ♀.

### **Johannsenomyia nemoralis** sp. n.

A small, blackish species, with unadorned wings, all the tibiae and the greater part of the femora very dark brown, and the femora and 5th tarsal segments neither inflated nor armed.

♂. Length of wing about 1·3 mm., greatest breadth about 0·4 mm.

*Head* almost black. Eyes widely separated above. Palpi dark brown, short, segments sub-cylindrical. Antennae almost uniformly very dark brown, the plume dark and rather scanty: segments 4–11 gradually narrowing from about 11 by 10 to 13 by 6–7 units; 12 only a little longer than 11, about 16 by 6–7 units; 13–15 elongate, about 27, 38, and 40 units respectively, the last without stylet. *Thorax* almost black, shining, with scanty short hairs. Anterior tubercle small. Scutellum almost black. *Wings* pale, unadorned, only anterior veins brownish. No macrotrichia, and no bristles excepting those on costa which are small and rather widely spaced especially near base. Microtrichia and fringe normal. Tip rather narrow. Anal lobe well developed. Costa extending about four-fifths length of wing, not extended beyond R4 + 5, its extremity slightly distal to level of end of Cu1. Two radial cells, both widely open: first almost rectangular, second about twice as long as first. M sessile, the distance between bases of M1 and M2 about same as length of cross-vein. Fork of Cu slightly distal to level of cross-vein. Halteres with pale,

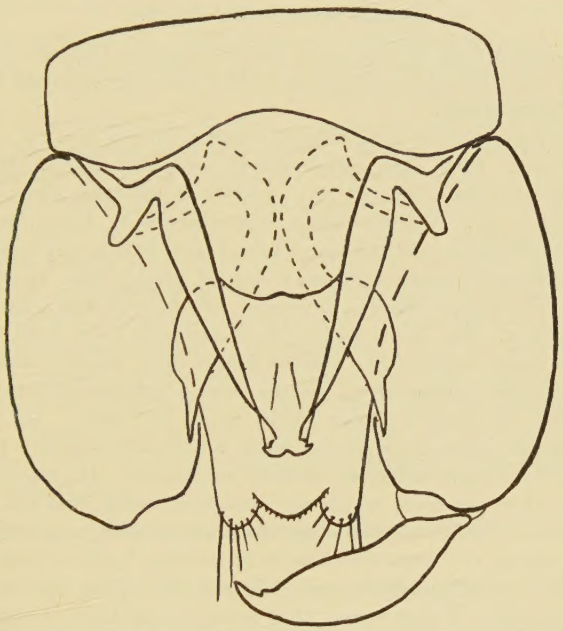

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FIG. 5.—*Johannsenomyia nemoralis* sp. n., hypopygium, ventral view.

brownish, knobs. *Legs* with basal segments, distal parts of femora, and entire tibiae very dark brown; but femora of fore legs not as dark as the others. Knees all dark. All tarsi paler brown, but last 2–3 segments more or less infuscated. Bristles and hairs scanty and not very long. Femora not definitely swollen, but those of fore and hind legs a little wider than others; all unarmed. Tarsi with 4th segment clearly sub-cylindrical on hind legs, shorter but not definitely cordiform or bilobed on four anterior legs; 5th segment on all legs not swollen, unarmed. T.R. about 2·5. Claws all small, equal, bifid at tips. *Abdomen* dark brown, but not as dark as thorax, with hairs very scanty and short. Hypopygium (fig. 5) blackish. Ninth sternite without bristles, slightly excavated in middle line posteriorly, the membrane joining it to aedeagus spiculate. Side-pieces oblique, rather long

and narrow; claspers small, bristly, ending in a strong claw. Harpes moderately well chitinised, each with an oval expanded portion distally, but terminating in a tapering process. Aedeagus highly chitinised, appearing in ventral view as shown in the diagram, the root-like basal processes strong, and the terminal stem-like part bifid and bent dorsally.

British Guiana: Mazaruni, clearing, 11.viii.1937, 1 ♂.

In the absence of females it is not possible, of course, to be sure of the genus to which this insect belongs, and it is therefore provisionally assigned to *Johannsenomyia*. It resembles in some respects *J. nigripes* Macfie, a species taken in Brazil, which, however, lacks the thoracic tubercle, and differs also in the adornment of the legs as well as in having the 5th segments of the tarsi armed. It may prove to belong to *Diplohelea*, but in the only species, *D. parvula* Kieffer, hitherto assigned to this genus the fork of the median vein is less clearly sessile and is described as being probably distal to the cross-vein.

### **Bezzia acanthodes** sp. n.

A dull brown insect with the abdomen lighter in colour than the thorax, with pale unadorned wings, and with all the femora and tibiae adorned with dark bands and armed with rather long black spines.

♀. Length of wing about 1·8 mm., greatest breadth 0·5–0·6 mm.

*Head* dark brown. Eyes bare, rather widely separated above. Palpi pale brown, third segment sub-cylindrical, without pit: lengths of last three segments about 20, 10, and 11 units respectively. Antennae short, with short hairs, torus darkish brown, segments 3–10 with basal halves pale and apical halves dark brown, and segments 11–15 dark brown but with bases pale brown: segments 4–10 oval, ranging from about 12 by 6 (middle) to 15 by 6 units; 11–14 more elongate, sub-equal, about 20–22 by 6 units; 15 about 25 by 6 units, without stylet. The combined lengths of segments 3–10, 4–10, and 11–15 about 111, 91, and 109 units respectively. *Thorax* rather dark brown, with traces of usual adornment and with pale pruinescence; bearing about 4 dark spine-like bristles on posterior portion, and a group of about 6 similar bristles above each wing. No anterior tubercle. Scutellum paler brown, more yellowish, in middle, but darker at sides: bearing 4 bristles. *Wings* and the veins almost colourless, without adornment. No macrotrichia; and no bristles excepting those on costa which are numerous, small, and set closely together. Microtrichia normal. Costa extending about three-quarters length of wing, not prolonged beyond R4 + 5, ending at a level about midway between levels of ends of M2 and Cu1. Single radial cell not exceptionally narrow. Tip rounded. Anal lobe not large, the angle obtuse. Fringe normal. M just sessile, that is forking at level of cross-vein. Fork of Cu distal to level of fork of M, its branches forming an acute angle. Halteres with infuscated knobs. *Legs* with basal segments dark brown, femora yellowish-brown in middle but with a dark brown band at both base and apex, tibiae yellowish-brown but with dark brown band at apex and another just before base, and tarsal segments paler yellow-brown with slightly infuscated apices. Femora normal, not swollen, all armed with a few rather long black spines. Tibiae also all armed with one or more similar spines. T.R. about 2·3. Tarsi all with 4th segment obliquely truncated, or bell-shaped in dorso-ventral view, not bilobed; 5th not swollen, unarmed. Claws all about half length of 5th tarsal segment, equal, each with a small barb on inner side. *Abdomen* almost uniformly rather light brown; cerci darkish. Gland rods on 7th tergite only, very long, reaching almost to base. Vulva without especial armature. Spermathecae 2, highly chitinised, sparsely pitted, oval, sub-equal, about 43 μ by 36 μ; the duct chitinised for only a short distance, about 3–4 μ, but rather wide, about 7 μ.

British Guiana: Mazaruni, clearing, 13 to 14.viii.1937, 5 ♀♀.

This insect is not a typical example of the genus *Bezzia*, differing notably in having all the tibiae armed with long spines, and is only referred to that genus because otherwise it would be necessary to erect a new genus for it.

**Bezzia (Probezzia) mazaruni** sp. n.

A small, very dark brown or blackish species, with paler brown scutellum, the hind legs adorned, and all femora and fifth tarsal segments unarmed.

♀. Length of wing about 1·8 mm., greatest breadth 0·6 mm.

*Head* almost black. Eyes bare. Palpi rather dark brown, the third segment sub-cylindrical, without pit: lengths of last three segments about 15, 12, and 10 units respectively. Antennae with torus very dark brown, flagellum segments dark brown but all with bases rather paler than rest: segments 4–10 oval, ranging from about 11 by 7 to 14 by 6 units; 11–14 more elongate, sub-cylindrical, sub-equal, about 20–25 by 5–6 units; 15 about 31 by 5 units, without stylet. The combined lengths of segments 3–10, 4–10, and 11–15 about 105, 85, and 125 units respectively. *Thorax* almost black. Anterior tubercle small and rather blunt. Scutellum paler brown than scutum. *Wings* unadorned, almost colourless. No macrotrichia, and no bristles excepting those on costa. Microtrichia normal. Tip rounded. Anal lobe moderately well developed. Fringe normal. Costa extending about four-fifths length of wing, its end slightly proximal to level of end of M2. Single radial cell not especially narrow. M sessile, distance separating bases of M1 and M2 about same as length of cross-vein. Fork of Cu almost at same level as cross-vein. Halteres with brownish knobs. *Legs* mainly pale brown, but basal segments very dark, and femora and tibiae all more or less infuscated. Hind legs with more definite adornment, having a dark brown band just before apex of femur, and another covering apical fifth of tibia. Terminal segments of tarsi also slightly infuscated. Form of segments normal. Femora not swollen, all unarmed. Tibiae without spines, those of hind legs with some rather long bristles. T.R. about 2·5. Tarsi all with 4th segment short, bell-shaped not cordiform, and not bilobed; 5th not swollen, unarmed. Claws on all legs small, equal, each with a minute barb on inner side. *Abdomen* dark brown, not quite as dark as thorax. Gland rods long, pale brown, present on tergites 5–7. Spermathecae 2, highly chitinised, pyriform or obovate, slightly unequal, total length about 55 μ, and greatest breadth about 35 μ.

British Guiana: Mazaruni, clearing, 16.viii.1937, 3 ♀♀.

**Bezzia (? Parrotia) aenipes** sp. n.

A large, rather dark brown but not blackish species with the wings adorned with a small dark area covering the cross-vein, the legs mainly dark yellowish-brown, all the femora unarmed and not greatly swollen, and the 5th tarsal segments armed.

♀. Length of wing about 5·4 mm., greatest breadth 1·3 mm.

*Head* dark yellowish-brown. Eyes apparently bare, separated above. Palpi paler brown. Antennae with torus rather dark yellow-brown, and flagellum segments mainly dark brown, but 4–10 with basal halves paler. Hairs normal, not stiff and lanceolate. Segments 4–10 similar, sub-equal, about 25–27 by 9–11 units; 11–15 elongate, cylindrical, sub-equal, 64–77 by about 7 units, the last without stylet. The combined lengths of segments 3–10, 4–10, and 11–15 about 220, 170, and 350 units respectively. *Thorax* dark amber brown, with sides almost black: not clearly narrowed anteriorly. No anterior tubercle. Scutellum dark amber brown. *Wings* with a small dark brown spot covering cross-vein, but without other adornment. Veins yellowish-brown. No macrotrichia. No bristles excepting those on costa which are small, numerous, and set closely together. Microtrichia conspicuous, covering whole surface of wing. Tip rather narrow but not

sharply pointed. Fringe normal. Anal angle obtuse. Costa ending at about same level as end of M2. Single radial cell not very narrow at any part, well open to end. Cross-vein very short, rather shorter than distance separating bases of M1 and M2. Fork of M a little proximal to cross-vein, that of Cu almost at same level. Halteres with blackish knobs. *Legs* much damaged. Coxae very dark brown or blackish. Fore legs with femora and tibiae dark yellowish-brown, darker at extremities than in middles, knees dark, first four segments of tarsi somewhat paler than tibiae, and fifth blackish : femora unarmed, somewhat dilated at distal end; tibiae unarmed; tarsi with 4th segment sub-cylindrical, not cordiform, 5th armed with numerous (about 19) black spines; and claws rather large, equal, and barbed on outer side. Middle legs (last segment of tarsi missing) similarly coloured; femora and tibiae unarmed. Hind legs with femur (rest missing) dark yellowish-brown, with apical half slightly enlarged, unarmed. *Abdomen* almost black. The unique specimen was not examined for details about spermatheca or gland rods.

British Guiana : High bush, bank of Mazaruni river, first fall, 18.viii.1937, 1 ♀.

This is a much larger species than *B. amnicola*, and differs from that insect also in the adornment of the wings and the legs.

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## APPENDIX

### Notes on the localities from which the Ceratopogonidae mentioned in Dr. Macfie's paper were taken.

By John Smart, Ph.D., F.R.E.S.

(*Department of Entomology, British Museum (Natural History)*.)

*Mazaruni*.—This designates the district around H.M. Penal Settlement on the north bank of the Mazaruni River just at its junction with the Essiquibo River, British Guiana. The rivers at this point are still influenced by the rise and fall of the tide. The land is flat and unless cleared it is normally covered with High Bush or Forest. The buildings of the Penal Settlement itself are built on a slight elevation of granite, the soil of the surrounding parts is sandy. The *Clearing* is an area round the buildings of the Settlement which is kept clear of bush by constant cutting and burning and is well drained with a system of ditches cut in the course of a highly successful anti-malarial campaign. Prison labour is available to keep the Clearing open. The Clearing is not more than

half a mile across in any direction. The *2nd Growth* (*Low Forest*) is a band of bush round the Clearing that has been burnt down in the past but allowed to recover. It is not drained. In places the vegetation is sparse and thin, while in others it has regrown well and contains well-grown trees. In a few places there are odd single specimens of large forest trees that appear to have survived the original clearing of this area. Some small streams and creeks run through the 2nd Growth and parts of it are marshy. It extends between the Clearing and the High Forest for an average distance of under half a mile. The *High Forest* or Bush that extends beyond the 2nd Growth is typical rain-forest. The soil is sandy and dry in those regions that are slightly elevated, while in the more depressed areas palm swamp is found. Various creeks pass through the forest and these go on to the rivers passing through the 2nd Growth. Most of the collecting which yielded CERATOPOGONIDAE was sweeping of low herbage and foliage along the tracks in the High Forest and the 2nd Growth and more generally in the Clearing.

*Mazaruni River, First Fall, High Bush.*—This locality, which was only a short distance up the Mazaruni River from the Penal Settlement on its southern bank, was very similar to the Mazaruni, High Forest locality.

*Kaieteur, Savannah and environs.*—This locality is at an elevation of about 1400 ft. The Savannah is not the typical grass savannah but a curious area of rather gravelly soil which carries a very sparse but curious vegetation. It has been described by Jenman (1882, *Timehri* **1** : 228) and mentioned by Smart (1938, *Ent. mon. Mag.* **74** : 198). The savannah itself is surrounded by High Forest and the reason for the use of " Savannah and environs " for the name of this locality is that, owing to a lapse in recording, the materials taken on the Savannah proper and from the surrounding High Forest were not clearly distinguished.

*Gorge of Potaro, Tukeit.*—From the Savannah the Potaro River drops over the Kaieteur Fall (740 ft.) into the gorge beneath (Smart, 1940, *Trans. R. ent. Soc. Lond.* **90** : 1–11). The gorge is filled with dense rain-forest which is continuously being soaked with the mists that fill the gorge at night and at other times. The floor of the gorge is very rough and is made up of sandstone that has broken away from the cliffs of the gorge and which is in the form of boulders that range in size up to that of a small house. The river in the gorge is torrential.

For a general description of the topography of British Guiana the works of Schomberg (1847, *Reis. brit. Guiana*), Barrington-Browne (1877, *Canoe and camp life in British Guiana*) and Beebe (1917, *Tropical Wild life in British Guiana*) may be consulted.

*Trinidad.—Blanchisseuse Rd., at Summit*, is a road that crosses the range of mountains that lie to the north of the Island. The vegetation is really tropical rain-forest but in the neighbourhood of the road it has been considerably modified by the works of man. The elevation is about 1000 ft. The *Piarco Savannah* is a grass savannah in the flat country some 12 miles E.S.E. of Port of Spain. There is some scrub on it as well as scattered palm trees. The *Arena Forest Reserve* is a forest reserve in the flat country some 18 miles E.S.E. of Port of Spain. The collection from this point was made at the roadside where the road passed through the reserve. Marshall (1934, *Trees of Trinidad* (*and Tobago*)) gives a general account of the flora and topography of Trinidad.

# *TETRIX CEPEROI* BOL. (ORTHOPTERA, SALTATORIA TETRIGIDAE) FROM THE CHANNEL ISLANDS

By Frederick E. Zeuner, Ph.D., F.Z.S.

Communicated by Dr. B. P. Uvarov, F.R.E.S.

In 1900, W. A. Luff reported a species of *Tetrix* from Guernsey and called it *Tetrix subulatus* (L.). This is a common species of temperate Europe, found usually near water. On my visit to Jersey, the results of which have recently been published (Zeuner, 1940), I looked for this species in suitable localities, such as St. Ouen's Pond, but did not find it. In the hot and dry, almost semi-desert dune-area of the Quennevais, however, I caught a single female of a *Tetrix*, together with *Euchorthippus elegantulus* Znr. and other southern elements.

This specimen is rather slender and small for *T. subulatus*, the surface of the pronotum is a trifle rougher, and the vertex between the eyes slightly narrower, reminding one of *Paratettix meridionalis* (Ramb.). Since, however, many species of the Jersey Saltatoria do show deviations of this kind from the characters of continental specimens, there was then no justification for doubting the identity of this single specimen with *T. subulatus*, the species already recorded from Guernsey.

In the meantime, Dr. B. P. Uvarov (1940) has revised the British specimens of *T. subulatus* which proved to belong to two distinct species. He found in the collection of the British Museum a male and a female from Guernsey, collected by Mr. W. E. China, and these in conjunction with my female from Jersey have enabled him to settle the specific identity of the *Tetrix* of the Channel Islands. It is not *T. subulatus* (L.), but *Tetrix ceperoi* Bol., a species recorded from Tangier, south Spain, Portugal, France (Basses-Alpes, Var, Ille-et-Villaine, Sologne, Loire Inférieure, etc.), Holland and England.

In the list of the Saltatoria of the Channel Islands (Zeuner, 1940 : 106), therefore, *T. subulatus* has to be replaced by *T. ceperoi*, until evidence is forthcoming that *T. subulatus* occurs there also. This is by no means unlikely. *T. subulatus* is a species fond of grassland in the neighbourhood of water, whilst *T. ceperoi* requires, as it seems, dry and sub-mediterranean environment.

Thus, another southern form is added to the Saltatoria of Jersey (and Guernsey), and the balance shifted even more in favour of the heat-loving, mediterranean element.

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# REVISIONAL NOTES ON THE GENUS *IDEOPSIS* MOORE (LEP. RHOP. DANAIDAE)

By G. Talbot, F.R.E.S.

The considerable material of this genus now arranged in the British Museum (Natural History) necessitates a revision of accepted ideas on the affinities of the known forms.

The material available for study in the Museum collection is enumerated under each form.

I am indebted to the Trustees of the British Museum for facilities in carrying out this study.

## Introductory.

*Ideopsis* is here considered to comprise four species, viz., *gaura* (Horsf.), *vitrea* Blanch., *klassika* Mart., and *hewitsoni* Kirsch. Three new forms are described herein.

The genus is clearly a natural one, all the forms being apparently derived from one, and no form occurring within the area of another.

The division of the genus into two groups, made by Fruhstorfer (1910), is not a good one. The antennal character is not constant, the main feature being the difference shown between the sexes. In the ♀ the club is gradual, narrow, and elongate as in *Danaus* and *Idea*. In the ♂ the club is abrupt, spatulate, and broad, with but slight variation except in *klassika*, where the club is more abrupt and definitely round, and in the ♀ as broad as in the ♂ of other species.

The position of vein 10 of the fore-wing varies among individuals of a species in the same area; it may arise at apex of cell, well before the apex, or from any intermediate point.

Furthermore, the division made by Fruhstorfer takes no account of relationships, and by separating *gaura* from *anapis* proclaims its artificiality.

The genitalia of most forms were examined, and only the uncus exhibits any obvious variation. Differences are not very marked, and are seen only in the shape of the two lobes. In the *gaura* complex these lobes are small and distinctly rounded. In the *vitrea* complex the lobes are larger and tend to be distally narrowed, especially in the South Celebes form; but there seems to exist no real dividing line between some forms of *vitrea* and those of *gaura*.

The linking up of *vitrea* with *inuncta* cannot be avoided, for if nominotypical *vitrea* from New Guinea is compared with *inuncta* from Banggai or Waigeu, the only real difference to be seen is that the hind-wing of *vitrea* has a yellow area which is white in *inuncta*. The further linking up of *aza* from the Sula Is. is afforded by comparing the form and position of the hind-wing apical patch. The Celebes hind-wing pattern, represented by *oenopia*, is a combination of *vitrea* with the Moluccan *chloris*, whilst the fore-wing resembles *vitrea*, *inuncta* and *iza*.

Similarly one cannot avoid linking up *anapis* with *gaura* and *daos*, all with an identical form of uncus. If *gaura* from Java and Simalur is to be separated from *daos* from Sumatra, Nias, Malaya and Borneo, it becomes difficult to account for the presence of a *gaura*-like form on Simalur, and for the greater similarity existing between the Javan form and the Philippine *anapis*. It is of interest to note that geographically the *gaura* complex is separated from other members of the genus by Wallace's Line.

Van Eecke, 1918 (*Zool. Meded.* **4** : 78) states that *gaura* and *daos* are the same species on genitalia and other points. He considers his *pseudocostalis* to be "clearly intermediate." Judging from a ♂♀ in the British Museum, this form is much more like the Javan one than any other.

*Key to species.*

1. Hind-wing with a post-discal row of black spots, some at least separate . . . . . *gaura* (Horsf.).
   Hind-wing without a post-discal row of distinct spots . . . . . 2.
2. Veins of both wings heavily blackened . . . . . *hewitsoni* Kirsch.
   Veins of both wings not heavily blackened . . . . . 3.
3. Fore-wing with hyaline or yellow band from inner margin to above vein 4 . . . . . *vitrea* Blanch.
   Fore-wing with a yellow band from inner margin to vein 3 . . *klassika* Mart.

*Ideopsis gaura* (Horsfield).

Genitalia with uncus bifid, lobes broad and rounded.

ssp. *perakana* Fruhstorfer, 1898.

Not easy to distinguish from the Sumatra race, but is somewhat paler.

*Hab.*—Malaya, a series of both sexes and types.

ssp. *eudora* (Gray), 1846 (*non* 1833 in MS.) (= *sonia* Fruhst., 1898, Deli).

Distinguished from the nominotypical form by the prominent rounded discocellular black spots on both wings, and large marginal and submarginal black spots on fore-wing.

*Hab.*—Sumatra, a series of both sexes from north, west, and south. Specimens from Deli are not constantly different, and *sonia* is not tenable.

ssp. *costalis* (Moore), 1883 (= *batuna* Fruhst., 1910).

A darker form with smaller spots. Fore-wing costal border blackened in ♂. Specimens from the Batu Islands are identical.

*Hab.*—Nias, series of both sexes and ♂ type; Batu Is., 3 ♂♂, 4 ♀♀ with ♀ type of *batuna*.

ssp. *nigrocostalis* (Hagen), 1902, Mentawej Is.

No specimens in the Museum collection.

ssp. *pseudocostalis* v. Eecke, 1914.

Darker than *costalis*, but not smoky-grey; veins more strongly blackened. Fore-wing submarginal spots larger; white spots between the marginal black ones prominent.

*Hab.*—Simalur Island, ♂♀.

ssp. *lingana* Fruhstorfer, 1910.

Probably not distinct from *eudora*, but possibly a lighter form.

*Hab.*—Lingga Islands, 2 ♂♂, 1 ♀, including types.

ssp. *gaura* (Horsf.), 1829.

Resembles *anapis* (C. Feld.) in having the vitreous area of fore-wing broken up into stripes whose outer edges are deeply incurved, and separated from the submarginal white spots. Colour smoky-grey to blackish-grey, ♀ paler. Hind-wing without a prominent discocellular spot.

*Hab.*—JAVA, a series of both sexes and ♂ type.

ssp. *daos* (Boisduval), 1836 (= *ardana* Fruhst., 1910).

Very close to *eudora* and perhaps only to be distinguished by the browner tinge in both sexes.

A number of specimens in the Museum collection have the post-discal spot in area 5 of fore-wing vestigial; this occurs also in all *eudora*-like forms.

form *infumata* Martin, 1909.

Applied to very dark specimens.

*Hab.*—NORTH AND SOUTH BORNEO, and PULO LAUT, a series of both sexes with ♀ type and types of *ardana* from N. Borneo. No specimens of *infumata*.

ssp. *natunensis* Fruhst., 1910.

Close to *perakana*. Fore-wing submarginal spots in areas 4 to 6 more elongate, especially apparent in the ♂. No other difference is detected.

*Hab.*—NATUNA ISLANDS, 2 ♂♂, 6 ♀♀, with types.

ssp. *anapis* (C. Felder), 1861.

*Hab.*—Described from LUZON. Only 1 ♂ in the Museum collection. This is labelled " Mindanao " but agrees very well with Felder's figure in the *Reise Novara*, t. 43, fig. 6. It was received from Semper in 1883.

ssp. *bracara* Fruhst., 1910.

Judging from a single female in the Museum collection, labelled " N. Luzon " (ex Coll. Joicey), this is a very light form, resembling the ♂ specimen of *anapis*. Fore-wing with much larger submarginal white spots, and hind-wing with much smaller black spots.

*Hab.*—N.E. LUZON.

ssp. *anapina* Semper, 1892, Leyte.

Darker than *anapis*, the veins more heavily blackened. Fore-wing with broader outer black border, and costal area more strongly blackened. Hind-wing post-discal black spots prominent, including one in area 1*c*.

*Hab.*—MINDORO, a series of both sexes. No examples from Leyte (type locality).

ssp. *glaphyra* Moore, 1883.

Wings dusky. Fore-wing with the discocellular black spot not reaching into area 3; usually a post-discal black spot in area 5. Hind-wing with discocellular black spot, and post-discal black spots as in *anapina*.

*Hab.*—MINDANAO, a series of both sexes, mostly without precise locality, otherwise from Davao, S.E. Mindanao. The type is in Coll. Semper (Mus. Senckenberg).

ssp. *messala* Fruhst., 1910.

A very light form. According to a female in the Museum, the fore-wing has a large discal black patch which fills base of area 3. Hind-wing without a discocellular spot, and no post-discal spot in area 1*c*.

*Hab.*—East Mindanao. 1 ♀ labelled "Mindanao," received from Semper, 1883.

ssp. **pellucida** subsp. n.

♂. Fore-wing broader than in *glaphyra*, which it resembles. Both wings without a discocellular patch. Fore-wing without a post-discal black spot beyond end of cell; outer black border noticeably wider below vein 3. Hind-wing as in *glaphyra*.

♀. Differs from *glaphyra* in the same way as the ♂. Fore-wing submarginal white spots in areas 1*b*, 2, and 3 much larger than in *glaphyra* ♀.

*Hab.*—Mindanao (*J. Waterstradt*) (ex Coll. Oberthür), 1 ♂, 2 ♀♀ (types); Mindanao, Gulf of Davao, Todaya, 10. x. (*J. J. Mounsey*) (ex Coll. H. Druce), 1 ♂.

This is possibly only a form of *glaphyra*.

form **itamputi** form. n.

♂. Fore-wing costal black more developed, the cell and subapical area being dusky as in *iza* Fruhst. Hind-wing with anterior three post-discal black spots conjoined, and on upperside almost merged with the black border.

Light areas of wings more white than in *pellucida* or *glaphyra*.

This form is placed here provisionally, and but for the hind-wing markings might be thought to belong to the *vitrea* group near *iza*.

*Hab.*—Uncertain. A single ♂ labelled "Kirwini, Trobriand Is., A. S. Meek" (ex Coll. Crowley).

*Ideopsis vitrea* Blanchard.

ssp. *iza* Fruhst., 1898.

Coloration white. Both wings without discocellular patches. Hind-wing with a subapical black patch formed of three conjoined spots, reaching vein 4. In other respects similar to *anapis*.

*Hab.*—Sula Is., series of both sexes, with types.

ssp. *ribbei* Röber, 1887.

Differs from *iza* in the more dusky coloration, the rather large subapical black patch on hind-wing, and by the veins of both wings being darkened. Fore-wing with costal and apical blackish-brown reaching lower edge of cell and to vein 5; submarginal white spots small.

*Hab.*—Banggai Island, 3 ♂♂, 2 ♀♀.

ssp. *inuncta* (Butler), 1866.

Fore-wing and anterior half of hind-wing slightly dusky, more so in ♂; costal black entering cell along upper edge.

*Hab.*—Waigeu, a series of both sexes, with ♀ holotype; Moluccas, Gebi Island, 4 ♂♂, 1 ♀.

ssp. **onina** subsp. n.

♂. Somewhat intermediate between *ribbei* and *inuncta*, but fore-wing dark borders more as in the latter; submarginal spots small, and cell darkened for the most part, as in *ribbei*. Hind-wing subapical black patch as large as in *inuncta*.

♀. Darker than *inuncta*, lighter than *ribbei*. Fore-wing cell dark as in the ♂; subapical area above vein 4 strongly dusky; submarginal spots as in *inuncta*. Hind-wing subapical patch larger than in *inuncta*, outer border wider; antemarginal dots on both wings dusky.

*Hab.*—Dutch New Guinea, Onin Peninsula, two days north of Fak Fak, 1700 feet, i.–ii.1908 (*A. E. Pratt*), 1 ♂, *id.*, xii.1907, 1 ♀ (ex Coll. Adams).

ssp. *serena* Joicey and Noakes, 1916.

♀. Both wings with veins less darkened than in the nominotypical form. Fore-wing with hyaline areas lighter. Hind-wing paler greenish-yellow.

*Hab.*—North Dutch New Guinea: Wandammen Mountains, 4 ♀♀, with type.

ssp. *vitrea* (Blanchard), 1853 (= *arfakensis* Fruhst., 1898).

Fore-wing smoky vitreous, outer borders not well defined. Hind-wing similar to *chloris* (C. Feld.), but paler green. ♀ similar to *chloris*, but fore-wing very slightly tinged with pale green.

*Hab.*—North-East Dutch New Guinea: coastal region to the Arfak, a series of both sexes, with type ♂ of *arfakensis*.

ssp. *chloris* (C. Felder), 1860 (= *salvini* Butler, 1866; *neleus* Fruhst., 1904, Buru; *morotaica* Fruhst., 1913, Morty I.).

♂. Fore-wing discal area green, contrasted sharply with the broad costal and outer dark borders. Hind-wing similarly green, with outer black border and large subapical black patch.

♀. Similar to ♂. Fore-wing green area reaching vein 6 and much wider; submarginal spots larger.

*Hab.*—Batjan, a series of both sexes, with ♀ type of *salvini*; Halmahera, 5 ♂♂, 7 ♀♀, with ♂ type of *salvini*; Ternate, ♂♀; Buru: Miro, xi.1898 (ex Coll. Crowley), 1 ♂; Miro, 1898 (ex Coll. Fruhstorfer), 2 ♀♀ (♀ holotype of *neleus*); " New Guinea," 1 ♀.

The type of *morotaica* is a ♀ and is identical with ♀ type of *neleus*. Apparently very rare in Buru, and was not obtained by the Pratt brothers who made large collections. Only recorded from Buru by Fruhstorfer.

ssp. *obiana* Fruhst., 1910.

Similar to *chloris*, but green ground-colour lighter, and on fore-wing forming a broader band, with a stripe in lower part of cell. ♀ very pale greenish-yellow.

*Hab.*—Obi, a series of both sexes. Types not marked in Coll. Fruhstorfer.

ssp. *arachosia* Fruhst., 1910.

Hind-wing discal black band broader than in *oenopia*, and in the ♂ usually extended into end of cell.

*Hab.*—South Celebes, a series of both sexes from Macassar, Maros, and Bonthain; type ♂, Patunuang; ♀, Samanga.

ssp. *oenopia* (C. Felder), 1859.

Fore-wing with discal hyaline band, and similar hyaline basal area on hind-wing. Hind-wing with post-discal yellow band.

*Hab.*—North Celebes, a series of both sexes; East Celebes, 2 ♂♂, 1 ♀; Central Celebes, 3 ♂♂, 3 ♀♀.

*Ideopsis klassika* Martin, 1910 (= *stresemanni* Rothschild, 1915, Ceram).

Markings greenish-yellow with distinct facies. Fore-wing with a subapical band; a post-discal band reaching vein 3. Hind-wing with a broad basal band, and prominent submarginal spots.

This species can also be recognised by its antenna, described in the introductory remarks.

*Hab.*—Central Ceram : Manusela Range, 3000 feet and upwards, a series of both sexes.

*Ideopsis hewitsoni* Kirsch, 1877.

Obviously allied to *vitrea* but with very distinct facies. Coloration whiter and less dusky, broken up into stripes by the broadly black veins, the edges of light markings sharply defined. Fore-wing outer border with inner edge regular in ♂, sometimes scalloped in ♀. Hind-wing with a subapical black curved bar reaching vein 4. Both wings with very prominent antemarginal spots, especially in the ♀.

*Hab.*—Schouten Islands, a series of both sexes from Biak. Described from the island of Mysore.

*List of Forms described as new.*

*Ideopsis gaura pellucida.* ♂♀, Mindanao.
*Ideopsis gaura pellucida* f. *itamputi.* ♂, habitat uncertain.
*Ideopsis vitrea onina.* ♂♀, Dutch New Guinea, Onin Peninsula.

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